US009636239B2

(12) **United States Patent**
Durand et al.

(10) **Patent No.: US 9,636,239 B2**
(45) **Date of Patent: May 2, 2017**

(54) **SYSTEM AND METHOD FOR MAPPING ACTIVITY IN PERIPHERAL NERVES**

(75) Inventors: **Dominique M. Durand**, Solon, OH (US); **Brian Wodlinger**, Cleveland Heights, OH (US)

(73) Assignee: **Case Western Reserve University**, Cleveland, OH (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1086 days.

(21) Appl. No.: **12/860,500**

(22) Filed: **Aug. 20, 2010**

(65) **Prior Publication Data**

US 2011/0046506 A1 Feb. 24, 2011

Related U.S. Application Data

(60) Provisional application No. 61/235,591, filed on Aug. 20, 2009.

(51) **Int. Cl.**

A61B 5/05	(2006.01)
A61F 2/70	(2006.01)
A61F 2/72	(2006.01)
A61N 1/05	(2006.01)
A61B 5/04	(2006.01)
A61B 5/00	(2006.01)
A61N 1/36	(2006.01)

(52) **U.S. Cl.**

CPC ***A61F 2/72*** (2013.01); ***A61B 5/04001*** (2013.01); ***A61B 5/4041*** (2013.01); ***A61N 1/0551*** (2013.01); *A61B 5/4064* (2013.01); *A61N 1/36003* (2013.01)

(58) **Field of Classification Search**

CPC . A61B 5/04001; A61B 5/4041; A61B 5/4064; A61B 5/076; A61F 2/72; A61N 1/0551; A61N 1/36103; A61N 1/0556; A61N 1/36003; A61N 1/36042; A61N 1/36067; A61N 1/08; A61N 2007/021

USPC 600/372, 554; 607/2, 45, 47, 48

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,560,372	A *	10/1996	Cory	600/554
6,171,239	B1 *	1/2001	Humphrey	600/372
2003/0093129	A1 *	5/2003	Nicolelis et al.	607/45

(Continued)

OTHER PUBLICATIONS

Struijk, J. J., Haugland, M. K., & Thomsen, M. (1996). Fascicle Selective Recording With a Nerve Cuff Electrode, 18th Annual International Conference of the IEEE Engineering in Medicine and Biology Society. (2.2.3: Peripheral Electrodes). 361-362.*

Primary Examiner — Christopher D Koharski
Assistant Examiner — Pamela M Bays
(74) *Attorney, Agent, or Firm* — Tarolli, Sundheim, Covell & Tummino LLP

(57) **ABSTRACT**

Systems and methods are provided for controlling an entity in response to activity in a peripheral nerve comprising a plurality of fascicles. A multicontact electrode assembly is configured to record activity from the peripheral nerve. A processing component includes a sensor mapping component configured to quantify activity associated with a proper subset of the plurality of fascicles, an evaluation component configured to determine an adjustment of the status of the controlled entity from the quantified activity of the proper subset of the plurality of fascicles, and a controller configured to provide a control signal, representing the adjustment of the status of the controlled entity, to the controlled entity.

9 Claims, 6 Drawing Sheets